Basin Plan Amendments for a Mercury Control Program for the Sacramento-San Joaquin River Delta Estuary

Staff Report Summary

In advance of the April 2008 hearing, staff released Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary, Staff Report (February 2008) for public review and comment. The proposed Basin Plan amendments and supporting documentation are included in the February 2008 Staff Report. The following is a summary of the proposed Mercury Control Program for the Sacramento-San Joaquin River Delta Estuary.

Introduction

Staff developed a mercury control program for the Sacramento-San Joaquin River Delta Estuary (Delta) that addresses federal requirements for a total maximum daily load (TMDL) and State requirements to amend the Water Quality Control Plan (Basin Plan) to implement a program to reduce mercury pollution in Delta fish. This report reviews the problem of mercury in the Delta and summarizes the proposed Basin Plan amendment for a control program for mercury and methylmercury. Attached to this report are the February 2008 proposed Basin Plan amendments (Attachment 1).

The Delta mercury control program is one of several control programs that have been developed or are under development to address mercury in the Central Valley Region. Mercury contamination in the Central Valley is widespread. Due to significant differences in sources, local hydrology, wildlife and human exposure, and available information, staff decided to complete a series of interrelated control programs. The Central Valley Water Board adopted mercury control programs (that contained the federal TMDL elements) for Clear Lake in 2002 and downstream in Cache Creek in 2005. These control programs were completed first because Cache Creek is the single largest contributor of mercury-contaminated sediment to the Delta and San Francisco Bay. After the Delta control program is completed, staff will develop mercury control programs to address the impaired tributaries upstream of the Delta and identify the major mercury and methylmercury sources in those watersheds.

Background

The Central Valley Regional Water Quality Control Board determined in 1990 that the Delta was impaired because fish had elevated levels of mercury that posed a risk for human and wildlife consumers. In 1998, the State Water Board identified the Delta mercury impairment as a high priority water quality issue. As a result, the Delta was added to the Clean Water Act Section 303(d) List of Impaired Water Bodies.

Once a water body is added to the 303(d) List, the State is required to develop control programs that meet federal requirements for TMDLs to eliminate the impairments. A TMDL is the total maximum daily load of a pollutant that a water body can assimilate

and still attain beneficial uses, such as the protection of humans and wildlife consuming locally caught fish.

The Delta has a human health advisory warning against the consumption of mercury-contaminated striped bass. Recent monitoring indicates that several more species, including largemouth bass and white catfish (two commonly-caught sport fish) have elevated concentrations of mercury in their tissue. Over 95% of the mercury in large fish is methylmercury. Bacteria in mercury-containing sediment methylate the mercury and form methylmercury. The methylmercury fluxes into the overlying water where it is absorbed by phytoplankton. It subsequently increases in concentration in successive levels of the aquatic food web. Large fish can have methylmercury concentrations that are five to six million times higher than that of the water in which they live.

Methylmercury is a potent neurotoxicant. Methylmercury exposure causes multiple effects in humans, including altered tactile sensation, decreased concentration and memory, loss of muscle control, delayed neurological development, and in very high concentrations, birth defects and death. Wildlife species may also experience neurological, reproductive or other detrimental effects from mercury exposure. Humans and wildlife are exposed to methylmercury through consumption of contaminated fish.

The 2008 Delta TMDL report describes a statistically significant relationship between methylmercury concentrations in water and methylmercury concentrations in fish tissue. It is expected that by reducing methylmercury in water, fish tissue methylmercury concentrations will be reduced. In general, methylmercury concentrations in sediment and water are related to inorganic mercury concentrations in sediment; however, certain environments, such as some seasonal wetlands, are highly efficient at producing methylmercury.

To reduce the water quality impairment, there is a need to focus on 1) reducing the concentration of mercury in Delta sediment by reducing the concentration of mercury on sediment entering the Delta and 2) reducing discharges of methylmercury entering the Delta. The mercury control program seeks to reduce both sources of inorganic mercury and methylmercury to reduce fish tissue contamination. Most of the mercury that has contaminated the landscape came from mercury and gold mining activities that began in the 1850s. Widespread mercury contamination is now contributing to the formation of methylmercury.

Sources of methylmercury in Delta waters are inputs from upstream watersheds and within-Delta sources such as wetlands and open water habitats, municipal and industrial wastewater, agricultural drainage, urban runoff, and atmospheric deposition. About 40% of methylmercury loads to the Delta come from within-Delta sources and about 60% come from tributary inputs. Methylmercury flux from sediments in wetland and open water habitats in the Delta provides most of the within-Delta loads (31% of all loads to the Delta). Wastewater treatment plants and agricultural runoff in the Delta account for about 4% and 3% of total methylmercury loads to the Delta, respectively. The upstream sources of methylmercury have not been quantified, but it is likely that the percentages of loading from different source types are similar to the distribution for in-

Delta sources. Sources of inorganic mercury include wastewater, urban runoff, atmospheric deposition, and tributary watersheds, which contribute mercury from wastewater, urban runoff, atmospheric deposition, inactive mercury and gold mines, and streambeds downstream from mines. Most of the total mercury load to the Delta comes from tributary watersheds that will be the subject of future mercury control programs and other State and federal abandoned mine land evaluations. Reductions in direct methylmercury inputs to the Delta are expected to have immediate, local improvements in the Delta (e.g., during the next 20 years). Because so much legacy mercury is already deposited in the streambeds and banks of tributary watersheds and is moving its way slowly to the Delta, and most mine cleanup actions are expected to take place upstream of major dams, reductions in upstream, mine-related mercury sources are expected to result in long-term improvements (e.g., during the next 100 years) rather than short-term improvements. However, there are actions included in the proposed control program that can be implemented now that would result in more rapid reductions in the amount of mercury-enriched sediment entering the Delta.

Basin Plan Amendment

The goal of the proposed mercury control program is to lower fish mercury levels in the Delta so that humans and wildlife can safely consume Delta fish. Major components of the proposed Basin Plan amendments are:

- Addition of a beneficial use designation of commercial and/or sport fishing (COMM) for the Delta;
- Numeric objectives for methylmercury in fish tissue that are specific to the Delta;
- An implementation plan for controlling methylmercury and total mercury; and
- A surveillance and monitoring program.

Beneficial Uses. The Basin Plan currently does not identify the commercial and sport fishing (COMM) beneficial use for the Delta. The staff recommendation is to add the COMM designation as a potential, rather than existing, beneficial use because the recommended fish tissue objectives are not yet achieved throughout the Delta.

Fish Tissue Objectives. Staff proposes numeric objectives for methylmercury in fish tissue (referred to as fish tissue objectives) for the Delta. Methylmercury is the most toxic form of mercury and accumulates in successive levels of the food chain.

Staff evaluated five alternatives for the fish tissue objectives, including no action and a range of fish tissue objectives that are based on varying the amount and the trophic level[1] of fish that can be safely consumed by humans. The recommended alternative would establish Delta-specific methylmercury fish tissue objectives of 0.08 and 0.24 mg/kg in fish tissue for large trophic level 3 and 4 fish and 0.03 mg/kg for small trophic level 2 and 3 fish. The proposed objectives are protective of threatened and

[1] "Trophic level" refers to position in the food chain. Trophic level 4 fish are top predators, such as catfish and bass. Trophic level 3 fish are mid-food chain fish, such as bluegill. Trophic level 2 fish eat mainly phytoplankton, the first step on the food chain.

endangered wildlife species that consume large or small Delta fish. In addition, the proposed objectives allow people to safely eat 32 g/day (eight ounces, uncooked, per week) of a mixture of Delta fish along with a moderate amount of commercial fish. The 32 g/day consumption rate is consistent with the consumption rate that the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) staff used to calculate the fish methylmercury objective for San Francisco Bay, which was approved by the State Water Resources Control Board in July 2007.

Implementation Plan. To achieve the fish tissue objectives, the implementation plan contains actions and time schedules to reduce methyl and total mercury sources to the Delta. Available information indicates that achieving an annual average methylmercury concentration of 0.06 ng/l in ambient Delta waters should enable attainment of the proposed fish tissue objectives. The goal of 0.06 ng/l methylmercury in ambient water is used to determine how much the existing methylmercury inputs to the Delta need to be reduced to achieve the proposed fish tissue objectives throughout the Delta. Because of differences in existing mercury fish tissue concentrations, the Delta is divided into seven areas, each with their own load reduction requirements.

The implementation plan is divided into two phases. Phase 1 (e.g., 2009-2016) requires dischargers to evaluate their methylmercury discharges and to develop management practices to control methylmercury. The Phase 1 plan also requires total mercury evaluation and minimization programs from large municipal wastewater and stormwater dischargers, improvements to the trapping efficiency of the Cache Creek Settling Basin, and total mercury load reductions from mercury-contaminated watersheds. The mercury activities should achieve the total mercury load decrease required by the San Francisco Bay mercury control program and reduce the amount of mercury available for methylation in Delta open-water and wetland habitats. For Phase 2 (2016-2030), dischargers would implement the methylmercury management practices to meet allocations, consistent with the Basin Plan, as amended after the Phase 1 study period.

The implementation plan has the following major components:

- Methylmercury allocations (in the form of mass limits) are given to point and nonpoint sources in the Delta and Yolo Bypass. The USEPA requires that each source have an allocation. Dischargers would need to achieve their allocations by no later than 2030, or as modified in a subsequent Basin Plan amendment (i.e., at the end of the Phase 1 study period).
- The plan requires methylmercury characterization and control studies in Phase 1 of implementation. The studies will identify variables that affect methylmercury production (characterization) and develop management practices to reduce methylmercury discharges (control). The studies are required from large wastewater treatment plants that discharge greater than 0.06 ng/l methylmercury and large municipalities that discharge to the Delta. Irrigated agricultural lands and wetlands that discharge to Delta subareas where the proposed fish tissue objectives are exceeded must conduct characterization studies; those that act as a net source of methylmercury to the Yolo Bypass or Delta must also conduct control studies. Dischargers may conduct studies either individually or in

collaboration with others. New methylmercury dischargers must participate in the studies.

- The plan establishes interim methylmercury concentration limits for large NPDES municipal WWTPs and municipal stormwater dischargers in the Delta and tributary watersheds, to be maintained while efforts are underway to achieve compliance with the 2030 methylmercury allocations. The concentration limits are set equal to current concentrations to minimize the chance that Delta conditions will worsen as a result of population growth in the region.
- The plan requires agencies responsible for water management activities to characterize and limit increases in methylmercury loading that could result from changes to flood conveyance in the Yolo Bypass, salinity standards in the Delta, dredging projects, and other water management practices that may affect Delta methylmercury levels.
- The plan includes guidance for pilot mercury offset projects that may take place during Phase 1 for those dischargers that want to offset their methylmercury by conducting a methylmercury or mercury reduction project at a site other than their own. It also provides mercury credit for dischargers that have made recent improvements to effluent quality.
- At the end of Phase 1, staff will review study and pilot offset project results, methylmercury control options, and methylmercury allocations, revise the TMDL if needed, and recommend changes to the methylmercury control program to the Central Valley Water Board, which would form the basis for Phase 2 implementation of methylmercury controls.
- Because many of the activities to reduce mercury levels are long-term, the plan requires large NPDES facilities, large NPDES stormwater dischargers, and agencies creating new wetlands to develop and implement a risk management program for people that eat Delta fish.
- The Cache Creek watershed is the most significant source of mercury to the Yolo Bypass, where large areas are being converted to wetlands. Reducing mercury loading from Cache Creek is a high priority. The plan requires improvements in the trapping efficiency and establishment of a maintenance program for the Cache Creek Settling Basin to limit mercury loading from Cache Creek.
- The plan includes requirements for dredging projects in the Delta to ensure that there will be no net increase in methylmercury and total mercury loads from dredging activities in Delta waterways or from the disposal of dredged materials.

Monitoring Program. The Basin Plan amendments include a monitoring program to assess compliance with the fish tissue methylmercury objectives and the methylmercury and total mercury implementation plan. The program includes fish tissue and water monitoring.

Environmental Analysis

The February 2008 staff report contains an environmental analysis of the potential impacts of the proposed Basin Plan amendments in accordance with the California Environmental Quality Act (CEQA). Adoption of the proposed Basin Plan amendments will not by itself have a physical effect on the environment, nor will the Phase 1 studies. However, implementation actions taken by responsible entities to comply with some components of the proposed implementation plan to control mercury could have unintended, adverse impacts on the environment. Implementation of the proposed Basin Plan amendments could result in potentially significant impacts to biological resources, hydrology/water quality, and utilities and service systems, unless appropriate mitigation is incorporated. The staff report summarizes reasonable actions to reduce the potential impacts from implementation projects. With one exception, all potential impacts are expected to be limited and mitigated to less than significant levels, if not completely avoided, through careful project planning, design, and implementation.

Implementation of methylmercury management practices to achieve safe fish mercury levels in the Yolo Bypass has the potential to result in cumulative impacts to wetland habitat that could support some special-status species that are endemic to a particular area of the Delta, such as Sacramento splittail and Delta smelt. Until the Phase 1 characterization and control studies have been completed, it is unknown whether wetlands that act as methylmercury sources in the Yolo Bypass also provide critical habitat to endemic species and whether it will be possible to avoid all potentially significant impacts. However, the environmental analysis identified several methods to minimize negative effects on wetland function, including implementing only management practices that do not change the desirable wetland functions, requiring aggressive total mercury controls upstream of the critical wetlands, and participating in an offset program to achieve methylmercury reductions elsewhere.

A fishery containing popular, but mercury-contaminated fish is an environmental justice issue. There are people in the Delta who consume local fish because of need, custom, or to supplement their diet. Implementation of the proposed Basin Plan amendments will result in overall improvement in water quality in the waters of the Delta region and will have significant positive impacts to the environment and public health over the long-term by enabling humans and wildlife to safely consume Delta fish.

Stakeholder & Peer Review Process

Developing a mercury control program for the Delta has been a lengthy process that has involved numerous stakeholders, including the regulated community, wetland managers, and environmental justice groups. Staff held a CEQA scoping meeting, two public workshops, two Board workshops, and over 25 stakeholder meetings. In June 2006, staff submitted the TMDL technical report and Basin Plan amendment staff report to scientific peer reviewers contracted by the State Water Board and made the reports available to the public. Since then, staff has revised many portions of the proposed Basin Plan amendment language and supporting documentation based on written and verbal comments from the scientific peer reviewers, workshop participants, and others. Staff provided responses to scientific peer review comments in Appendix F

of the February 2008 Basin Plan Amendment staff report. Changes to TMDL calculations are listed at the end of Chapter 1 and beginning of Chapter 8 in the TMDL Report. Key changes to the proposed Basin Plan amendment since June 2006 resulting from stakeholder input are summarized in Attachment 2 of this document.

The Central Valley Water Board held a public workshop on 16 March 2007 to discuss the mercury control program. Some of the major questions and comments that arose during the workshop and staff responses are included in Attachment 3.

Proposed Delta Mercury Control Program Effectiveness and Cost

Actions in the proposed Delta mercury control program to reduce methylmercury and total mercury will benefit not only the Delta but also the upstream watersheds. The Delta program will establish the framework for future tributary control programs.

It is important to recognize that the Delta fish impairment will be addressed by controlling both methylmercury discharges and by taking actions to reduce the concentration of mercury in sediment in key locations throughout the Delta and its tributary watersheds. Methylmercury management efforts, along with high-priority inorganic mercury control actions downstream of major dams (e.g., improving the Cache Creek Settling Basin), will result in more immediate improvements in the local Delta area. Legacy mercury control actions that take place further upstream will result in more widespread improvements (e.g., in the creeks downstream of a mine cleanups, as well as in the Delta and downstream San Francisco Bay), but it may take many decades before downstream improvements associated with mine cleanups are observed.

Achieving the Delta allocations will address about 30% of the total methylmercury load reduction required to address the fish impairment in the Delta. The rest of the required methylmercury load reductions will come from methylmercury and total mercury control actions that will be implemented in the upstream watersheds. Upstream control programs are scheduled for development and implementation before the 2030 deadline. The upstream programs will be able to take advantage of, and build upon, the methylmercury management practices developed during Phase 1 of the Delta program. In addition, the Delta and upstream control programs will continue to identify high priority legacy mercury reduction projects. It is anticipated that this combination of actions can achieve the fish tissue objectives throughout the Delta.

The implementation cost estimated for the Delta mercury control program is comparable to costs estimates for other mercury control programs in the region. Staff's cost evaluations indicate that the Phase 1 methylmercury characterization and control studies could cost about $2.8 to $7.5 million.

Implementing the Delta mercury control program could cost between $6 million and $22 million per year, with most of the implementation costs being incurred after 2016

(Phase 2). The cost estimate includes actions to reduce total mercury loading and implementation of methylmercury management actions.

Attachments:

1. Draft Basin Plan Amendments, February 2008
2. Proposed Basin Plan Amendments for a Delta Mercury Control Program: Revisions Based on Stakeholder Comments since June 2006
3. Staff Responses to March 2007 Workshop Comments